

Class –X

Subject – Science

CHAPTER – 3

METALS AND NON-METALS

CHEMICAL PROPERTIES OF METALS

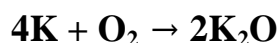
REACTION OF METAL WITH OXYGEN:

Most of the metals form respective metal oxides when react with oxygen.

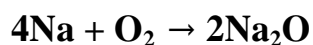


Examples:

Reaction of potassium with oxygen: Potassium metal forms potassium oxide when reacts with oxygen.

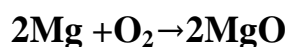


Reaction of sodium with oxygen: Sodium metal forms sodium oxide when reacts with oxygen.

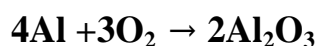


Lithium, potassium, sodium, etc. are known as alkali metals. Alkali metals react vigorously with oxygen.

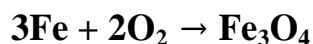
Reaction of magnesium metal with oxygen: Magnesium metal gives magnesium oxide when reacts with oxygen. Magnesium burnt with dazzling light in air and produces lot of heat.



Reaction of aluminium metal with oxygen: Aluminium metal does not react with oxygen at room temperature but it gives aluminium oxide when burnt in air.

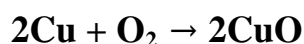


Reaction of Iron metal with oxygen: Iron does not react with oxygen at room temperature. But when iron is heated strongly in air, it gives iron oxide.



Iron fillings give sparkle in flame when burnt.

Reaction of copper metal with oxygen: Copper does not react with oxygen at room temperature but when burnt in air, it gives copper oxide.



METAL OXIDES: CHEMICAL PROPERTIES

Metal oxides are basic in nature. Aqueous solution of metal oxides turns red litmus blue.

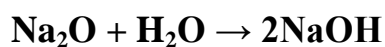
REACTION OF METAL OXIDES WITH WATER:

Most of the metal oxides are insoluble in water. Alkali metal oxides are soluble in water.

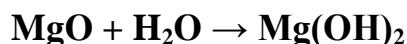
Alkali metal oxides give strong base when dissolved in water.

Examples:

- 1) Reaction of sodium oxide with water: Sodium oxide gives sodium hydroxide when reacts with water.



- 2) Reaction of magnesium oxide with water: Magnesium oxide gives magnesium hydroxide with water.



- 3) Reaction of potassium oxide with water: Potassium oxide gives potassium hydroxide when reacts with water.



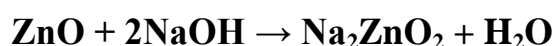
- 4) Reaction of zinc oxide and aluminium oxide: Aluminium oxide and zinc oxide are insoluble in water. Aluminium oxide and zinc

oxide are amphoteric in nature.

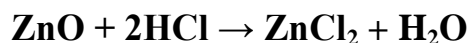
Amphoteric oxide(substance)

An amphoteric oxide (substance) shows both acidic and basic character. It reacts with base like acid and reacts with acid like a base.

- a) When zinc oxide reacts with sodium hydroxide, it behaves like an acid. In this reaction, sodium zincate and water are formed.

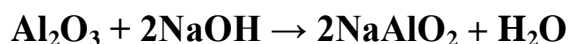


Zinc oxide behaves like a base when reacts with acid. Zinc oxide gives zinc chloride and water on reaction with hydrochloric acid.

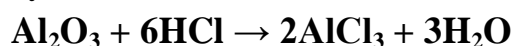


- b) In similar way aluminium oxide behaves like a base when reacts with an acid and behaves like an acid when reacts with a base.

Aluminium oxide gives sodium aluminate along with water when reacts with sodium hydroxide.



Aluminium oxide gives aluminium chloride along with water when it reacts with hydrochloric acid.



Anodising

Anodising is a process of forming a thick oxide layer of aluminium. Aluminium develops a thin oxide layer when exposed to air. This aluminium oxide coat makes it resistant to further corrosion. The resistance can be improved further by making the oxide layer thicker. During anodising, a clean aluminium article is made the anode and is electrolysed with dilute sulphuric acid. The oxygen gas evolved at the anode reacts with aluminium to make a thicker protective oxide

layer. This oxide layer can be dyed easily to give aluminium articles an attractive finish.

REACTION OF METALS WITH WATER:

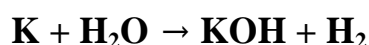
Metals form respective metal hydroxide and hydrogen gas when react with water.



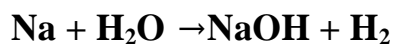
Alkali metals react vigorously with water.

Examples:

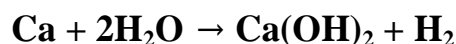
Reaction of potassium metal with water: Potassium metal forms potassium hydroxide and liberates hydrogen gas along with lot of heat when reacts with water.



Reaction of sodium metal with water: Sodium metal forms sodium hydroxide and liberates hydrogen gas along with lot of heat when reacts with water.

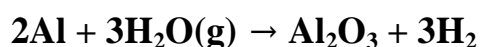


Reaction of calcium metal with water: Calcium forms calcium hydroxide along with hydrogen gas and heat when reacts with water.



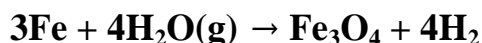
Calcium starts floating because the bubbles of hydrogen gas formed stick to the surface of the metal.

Reaction of aluminium metal with water: Reaction of aluminium metal with cold water is too slow to come into notice. But when steam is passed over aluminium metal; aluminium oxide and hydrogen gas are produced.



Reaction of Iron with water: Reaction of iron with cold water is very slow and come into notice after a long time. Iron forms rust (iron oxide) when reacts with moisture present in atmosphere.

Iron oxide and hydrogen gas are formed by passing of steam over iron metal.



CHEMICAL PROPERTIES OF NON-METALS

REACTION OF NON-METALS WITH OXYGEN:

Non-metals form respective oxide when react with oxygen.

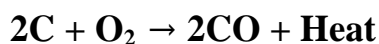


Examples:

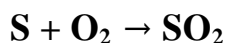
When carbon reacts with oxygen, carbon dioxide is formed along with production of heat.



When carbon is burnt in insufficient supply of air, it forms carbon monoxide. Carbon monoxide is a toxic substance. Inhaling of carbon monoxide may prove fatal.



Sulphur gives sulphur dioxide when react with oxygen. Sulphur caught fire when exposed to air.



NON-METAL OXIDE:

Non-metal oxides are acidic in nature. Solution of non-metal oxides turns blue litmus red.

Examples:

Carbon dioxide gives carbonic acid when dissolved in water.



Sulphur dioxide gives sulphurous acid when dissolved in water.

